

**Working
Paper**

2004/3

Could Ecolabeling Mitigate Market Failures? An Analysis Applied to Agrofood Products

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Abstract:

For the market for ecofriendly characteristics of agrofood products to function effectively, means of mitigating asymmetric information, informational overload and public goods properties are necessary. We show that ecolabel success requires a design and an implementation capable of mitigating simultaneously these several market failures. We then apply our analysis to existing ecolabels that help alleviate one or more of these failures. In the literature, the ecolabel is often analyzed as a tool to re-establish informational symmetry between firms and consumers. Our contribution is to extend the analysis to also view the ecolabel as a way to overcome informational overload and public goods problems.

Our paper is organized in 3 sections. The first section shows how environmental attributes turn out to be a source of market failures. Because of their credence properties – consumers cannot get the information about quality neither before nor after purchase, environmental attributes may lead to adverse selection. Moreover, the complexity of environmental information and ecolabels on products may imply and/or strengthen informational overload. Finally, their public goods properties may entail free riding and assurance problems. In a second section, we analyze how market failures may be mitigated by providing an accurate and credible information, adding other attributes verifiable by consumers – attributes used as proxies for credence attributes, designing the ecolabel as a cognitive support for consumers and adding private benefits. In a third section, we provide a qualitative study of several existing ecolabels to stress how they more or less succeed in attenuating these failures.

Key words: Ecolabeling; Market failures; Agrofood products.

JEL Classification Numbers: D11, D21, L15

¹ We thank the French Agency for Environment and Energy Management (ADEME), the Regional Council of Burgundy, the Scientific Committee of the ENESAD and the Inter-Institutional Program for Research in Environmental Economics (PIREE) for their financial support.

² An earlier version of the paper was presented at the conference on “Ecolabels and the Greening of Food Markets”, Nov. 7-9, 2002, Boston, Tufts University.

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1. Introduction

On the demand side, many consumers express a willingness to pay for agrofood products that they perceive as having minimal environmental impact or less of a negative environmental impact than similar products and services. On the supply side, producers are willing to market ecofriendly products to capture the consumers' willingness to pay. This assertion seems well supported by several empirical studies measuring consumers' willingness to pay for ecofriendly agrofood products (Table 1).

Product	Designation	Segment size Willingness to pay a price premium	Method	Country	Source Date
Corn	Integrated pest Management	84% of the respondents willing to pay 10% more	Consumer survey	United States	Anderson et al. (1996)
Fresh vegetables	Environmental friendly vegetables	70% willing to pay 5% more	Consumer survey	Netherlands	Wandel and Bugge (1997)
Fresh vegetables	Integrated pest management	37,8% of the respondents willing to pay at least 10% more	Consumer survey	United States	Govindasamy and Italia (1998)
Apples	Ecolabeled products	With a premium of \$.40 over 40% would still buy	Consumer survey	United States	Blend and Ravensawaay (1999)
Pork products	Embedded with environmental attributes	62 % of the participants paid an average premium of 22 %	Experimental auction	United States	Kliebenstein and Hurley (1999)
Coffee	Shade grown coffee	42% willing to pay at least 1\$ more per pound	Consumer survey	Canada	CEC (1999)
Coffee	Shade grown coffee	36 % willing to pay at least 1\$ more per pound	Consumer survey	Mexico	CEC (1999)
Coffee	Shade grown coffee	28% willing to pay at least 1\$ US more per pound	Consumer survey	United States	CEC (1999)
Fresh food products	Agromilieukeur	"Consumers are typically paying a small premium (up to 10%) for these products"	Real premium on the market	Netherlands	Granatstein (2000)
Lamb	Produced in an environmentally friendly way	More than 50% of consumers are willing to pay a premium of 10 to 20%	Consumer survey	France Germany	Rahmann et al. (2001)
Apple juice	"Green" apple juice	"Some consumers are willing to pay up to 40 per cent more"	Consumer survey	Canada	Van Duren and Rollins (2000) ³

Table 1: Consumers' willingness to pay for ecofriendly food products⁴

Because of their economic properties, environmental characteristics⁵ embedded in agrofood products are frequently not provided at an efficient level. The "invisible hand" of free markets fails to provide these environmental characteristics at a Paretian optimum, notably because they are public goods and credence attributes. In the literature, ecolabeling is frequently proposed as a market linked tool for

³ Results reported by Vrbaski, Mirjana, in Guelph Mercury, 02/17/2000, "Some of us are willing to pay 40 per cent more for 'green' products, University of Guelph researchers learn; Consumer survey finds green is supreme".

⁴ These studies are not homogeneous according to several features: definition of ecofriendly products (single attribute or several environmental attributes), methods of assessment (first, second or third party certification), locations, methods for collecting data, dates of surveys, etc. Consequently, comparisons and generalizations require prudence.

⁵ Conforming to the economic literature, we use the term "characteristics" for features of a product that are objectively measured whereas the term "attributes" stands for features that are perceived by consumers.

addressing the market failures resulting from asymmetrical information. Ecolabels can help reduce the asymmetric information between producer by conveying to consumers information related to environmental implications of products. Consequently, ecolabels help transform environmental awareness of consumers into consumption changes. Ecolabels also confront two other problems capable of disrupting the market mechanism, i.e. the limited abilities of consumers to process increasing flows of information and the public nature of environmental characteristics. Our contribution extends the analysis by considering the ecolabel as a way to overcome simultaneously information asymmetry, informational overload and public goods problems. *Is ecolabeling capable of mitigating simultaneously these three sources of market failures?*

Our paper is organized in three sections. The first one shows how environmental attributes turn out to be a source of market failures. Because of their credence properties, environmental attributes may lead to adverse selection and moral hazard. Consumers are being overwhelmed by many informational impulses, competing for their attention. Adding complex environmental information on products may strengthen informational overload. Public goods properties of environmental characteristics may entail free riding and assurance problems. These obstacles can partially explain why declarative willingness to pay does not necessarily correspond to effective purchases. In a second section, we analyze how market failures may be mitigated by emphasizing private benefits, providing accurate and credible information, adding other attributes verifiable by consumers – attributes used as proxies for credence attributes – and designing the ecolabel as a cognitive support for consumers. In a third section, we provide a qualitative study of several existing ecolabels on agrofood products to stress how they more or less succeed in attenuating simultaneously these different sources of market failures. As far as we know, this study is the first one to analyze how designers attempt or fail to take into account the previous sources of market failures.

2. Environmental attributes of agrofood products: a source of market failures

"Eco-labeling can provide the missing market information about production process attributes and be used as a mechanism revealing consumer valuation of environmental attributes of agricultural commodities" (Moon et al., 2002). Ecolabeling is frequently considered as a way to overcome the market failure resulting from asymmetrical information between the producer and the consumer. But this view seems restrictive, because marketing of ecofriendly agrofood products generates other market failures, which also determines success of ecolabeling schemes.

(1) Asymmetrical information between producers and consumers

Environmental characteristics of agrofood products correspond notably to impacts of farming and processing practices on the environmental fields (e.g. water, soil, air, biodiversity, etc) which are dissociated from product consumption. These environmental attributes are frequently credence goods according to the typology of Nelson (1970) and Darby and Karni (1973). We extend the original concepts of search, experience and credence attributes by categorizing attributes according to the most usual way consumers use to check or deduce quality. According to the considered attribute, consumers will undertake different kinds of expenditures to get "informational input" of their decision making process. In the case of search attributes, consumers inspect the product before purchase and get information. Search costs can correspond to the time consuming process of inspecting the product. For experience attributes, the most cost-effective way to get the information is to consume the product. Experience costs correspond to the cost of purchasing the product. If product quality remains constant, consumers can base their future purchases on the information acquired during the first consumption. Credence attributes cannot be accurately and efficiently evaluated even after purchase or consumption, because the consumer lacks technical expertise and/or the cost of acquiring sufficient and accurate information is more costly than its expected value and/or there is no tangible link between the expected attributes and consumption of the product. In most cases, credence attributes are well known

by the producers, but are hidden to consumers⁶. Frequently the most cost-effective way is to give credence to a third party assessment, e.g. an eco seal of approval. This seal of approval constitutes a cost-effective proxy instead of getting information by more direct means. Credence costs are the costs of getting the proxy, which allows consumers to give credence to the seller's promise. For example, the costs of a third party seal of approval are generally high and repetitive at each transaction (Table 2).

Attributes	Definition	Transaction costs		Examples	Seminal authors
		Pre-transaction	Post-transaction		
Search attributes	Consumers get information before purchase by inspecting the attribute	Search costs Low	-	Visible color of an apple	Nelson (1970)
Experience attributes	Consumers get information by experimenting the attribute after purchase because this way is the more cost-effective	Experience costs High	Low	Taste of an apple	Nelson (1970)
Credence attributes	Consumers give credence to a "proxy" because getting information by more direct means is prohibitively costly	Credence costs High	High	Apple from an ecofriendly agricultural process	Darby and Karni (1973)

Table 2 : Classification of attributes of goods according to transaction costs

This informational asymmetry leads to adverse selection and moral hazard. Adverse selection corresponds to hidden information e.g. the environmental characteristics are already achieved, but producers can cheat by providing false information. Moral hazard corresponds to hidden behavior, e.g. by changing environmental characteristics from a transaction to another. Because producing environmental characteristics mainly depends on initial investments done once for all, e.g. acquisition of knowledge, skills, materials, we can consider that the moral hazard framework is inaccurate in a simplified approach⁷. Consequently, it remains the adverse selection analyzed by Akerlof in his seminal article (1970). Adverse selection leads honest producers not to market their high quality products. If consumers are unable to check environmental characteristics, fraudulent sellers can market bad products with a green image. Fraudulent producers are free riders on a market of credence attributes. Consumers agree to pay a premium for environmental attributes. Fraudulent sellers want to recover this premium. But purchasers anticipate sellers' temptation to cheat and then reduce their willingness to pay for environmental friendly products. This misleading situation can come from proliferation of false, spurious, deceptive environmental claims in the market. Sellers of true environmental friendly products are penalized and cannot cover their higher production cost. They reduce their willingness to market true environmental friendly products and lastly, this situation leads to the elimination of true ecofriendly products.

(2) *Informational overload as a source of market failure*

We distinguish informational asymmetry from informational overload, even if the dividing line is fuzzy and not well defined. Informational asymmetry corresponds to an unequal repartition of information between two agents. This unequal repartition allows the best-informed agent, e.g. the seller to profit from his advantage. Informational overload arises because of limited cognitive abilities of agents. Even in a world characterized by symmetric information, agents can be overwhelmed by increasing flows of information. Agents' attention becomes the scarcest resource. The situation

⁶ Some credence attributes do not correspond to an informational asymmetry between seller and purchaser but to, incompleteness, uncertainty and controversies shared by all agents. Scientific knowledge is not established and nobody can probabilize the future, like about health effects of genetically modified organisms (GMO) or global climatic change.

⁷ For a similar postulate, see Rogerson (1983).

corresponds to a sequential process. In the first stage, huge amounts of information are available and agents need to allocate their attention. In the second stage, agents can seek to mitigate informational asymmetry for a specific issue, which has captured their attention. H. Simon⁸ (1995) recognizes that information symmetry can not be sufficient to ensure market efficiency. Indeed, limited abilities of consumers can lead to inefficiency of providing accurate information. Simon stresses the need for a switch from an "economy of information" to an "economy of attention": "What information consumes is rather obvious: it consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention, and a need to allocate that attention efficiently among the overabundance of information sources that might consume it." Indeed, consumers have less time and limited abilities to process increasing information flows. This situation requires more than solving an asymmetrical informational situation, i.e. providing accurate and credible information. In a first approach, competition for consumers' attention arises in rich informational context, because of the label itself that provides too much information or because of competition between several sources capable of capturing consumers' attention, e.g. other labels, store environment. New information and communication technologies reinforce this situation by providing "huge amounts of information, but most seekers of information face constraints that are tight enough for them to rely mainly on sources with an established reputation for credibility" (Andersson, 2002; see also Davenport and Beck, 2000). For example, in a well-documented study on different kinds of ecolabels, Wynne (1994) shows that environmental report cards⁹ establish a symmetrical but useless information because of information overload and technical inability of consumers to process it. Recently, the German Federal Environmental Agency stresses how competition between ecolabels and other impulses for attention can provoke a market failure: "The flood of other ecolabels also poses a problem for the first environmental label [Blue Angel]. A great deal of packaging is meanwhile emblazoned with half-a-dozen badges all of them courting the customer's favor. Attracting attention has become more difficult. (...) The average person is confronted daily with 3000 advertising impulses" (German Federal Environmental Agency, 2002¹⁰).

(3) *Environmental characteristics of agrofood products are public goods*

The environmental improvement (or degradation) generated by the environmental characteristics of ecofriendly (conventional) products frequently has properties of public goods. Indeed, the consumption of this kind of attributes by an individual A does not reduce the quantity available for another individual B (non-rivalry) and, when these characteristics are produced, it is practically impossible to prevent someone from consuming them (non-excludability). In reality, most products are neither pure public good nor pure private ones, but contain a mix of private and public characteristics. These characteristics of non-rivalry and non-excludability imply that the purchase of ecofriendly products does not guarantee to the purchaser an exclusive utility from the environmental improvements generated by his purchase. Generally, environmental impacts are global and consumer verification of the impacts is impossible, e.g. the state of the ozone layer. Other environmental characteristics become tangible after a long time, longer than a typical consumer's life expectancy, e.g. the exhaustion of natural resources. Several environmental characteristics result from the total of polluting emissions generated by a product market. Frequently, it is not feasible to exclude those who do not consume ecofriendly product, e.g. air quality, from the benefits generated by environmentally conscious purchasers. Environmental characteristics of agrofood products can affect the welfare of future generations who are unable to express their preferences. Moreover, an individual consumer cannot frequently evaluate the real benefits of his contribution (Nadaï, 1998). For example, air quality, the quality of ground waters, landscapes and the preservation of biodiversity correspond to the

⁸ Herbert Simon, in *Scientific American*, September, 1995, p. 201.

⁹ For example, Green Cross is a US environmental report card, which provides a detailed and graphical information about performance and environmental impacts of the product, based on a cradle-to-grave study of the product, without value judgement. The report card resembles a nutritional label and aims at allowing the purchaser to compare the environmental burden of one product relative to another.

¹⁰ Federal Protection Agency, 2002, *The Blue Angel Makes a Fresh Start - New Paths to Public Awareness*, Umweltzeichen Newsletter, 5: 1-2.

definition of public goods. Consequently, the individual does not bear all the results of his decision. Public goods lead to a misallocation of scarce resources because the decision making process does not take into account all the costs¹¹. However, we recognize that some environmental characteristics can provide private benefits e.g. less consumption of energy during the consumption phase, longer durability, less packaging and lower pesticides residues in food products. For the following sections, we consider that the environmental characteristics of ecofriendly products have essentially public properties. The private production of these environmental characteristics can generate two distinct problems:

(A) **The free riding problem:** Since the good is available to everybody, the free riders consume it without providing a contribution corresponding to their consumption. Consider the example of an ecofriendly car that preserves the air quality by decreasing its polluting emissions. It is obvious that the individual who is willing to pay the premium related to this ecofriendly car will not be the only person who benefits from his own contribution. This situation can lead potential purchasers to adopt free rider behavior and do not encourage producers to provide the public good, because they will not cover their production costs. This problem is well documented and the presumption of neoclassical economics is that the public good will be under-provided by private and decentralized markets.

(B) **The assurance problem:** In this case, the agent does not contribute for the production of a public good because he believes that the good will not be produced anyway. Indeed, the production of certain public goods requires a minimum level of contribution. If these contributions are insufficient, the good will not be produced and the individual will think he has squandered his contribution, corresponding to the "sucker" payoff (Schmidtz, 1991). For example, a consumer can renounce purchasing an ecofriendly agrofood product to preserve ground water because he is convinced that his sole contribution is too weak to induce a perceptible environmental improvement in ground water quality. The assurance problem is especially crucial when environmental quality depends on the environmentally conscious behavior of many consumers. The isolated purchase of an ecofriendly product does not generate tangible benefits for the group or the contributing agent. Consumers are willing to contribute if they are convinced that an adequate threshold of contributions will be reached, i.e. a sufficient number of contributors will also contribute.

(C) **Distinguishing the free riding from the assurance problems:** Note that the free riding situation arises because of opportunistic behavior. The individual may decide not to contribute because he can benefit from the collective good for free. The assurance problem does not presuppose that agents are self-interested. The individual is willing to contribute, but he fears wasting his contribution because the necessary funding will not be reached to provide the public good.

The three sources of market failures are represented in the figure 1. From the most internal problem (inside the individual) to the most external one (the entire context is affected), we successively identify the three sources. Individuals experience an internal conflict between their consumers' preferences and their citizens' preferences. Preference orderings in these two fields are not compatible¹². Consumers' preferences are about what the consumer wants whereas citizen preferences are about what we should do as a group (Sagoff, 1988). We do not deal with this question in this paper. Between consumers and sellers, there is a two-sided informational asymmetry. Consumers face a multi-sided situation because of the free riding behavior and the assurance problem among themselves. Lastly, an informational overload can lead to the need to allocate efficiently consumers' attention.

¹¹ In some cases, certain consumers may want to reduce the environmental impacts of their own consumption and the transaction can be considered as involving private goods. Others care about the whole environmental quality and face a true public good problem.

¹² To describe this internal conflict, Sagoff (1988) states "I love my car; I hate the bus. Yet I vote for candidates who promise to tax gasoline to pay for public transportation. I send my dues to the Sierra Club to protect areas in Alaska I shall never visit. [...] I have an "Ecology Now" sticker on a car that drips oil everywhere it's parked."

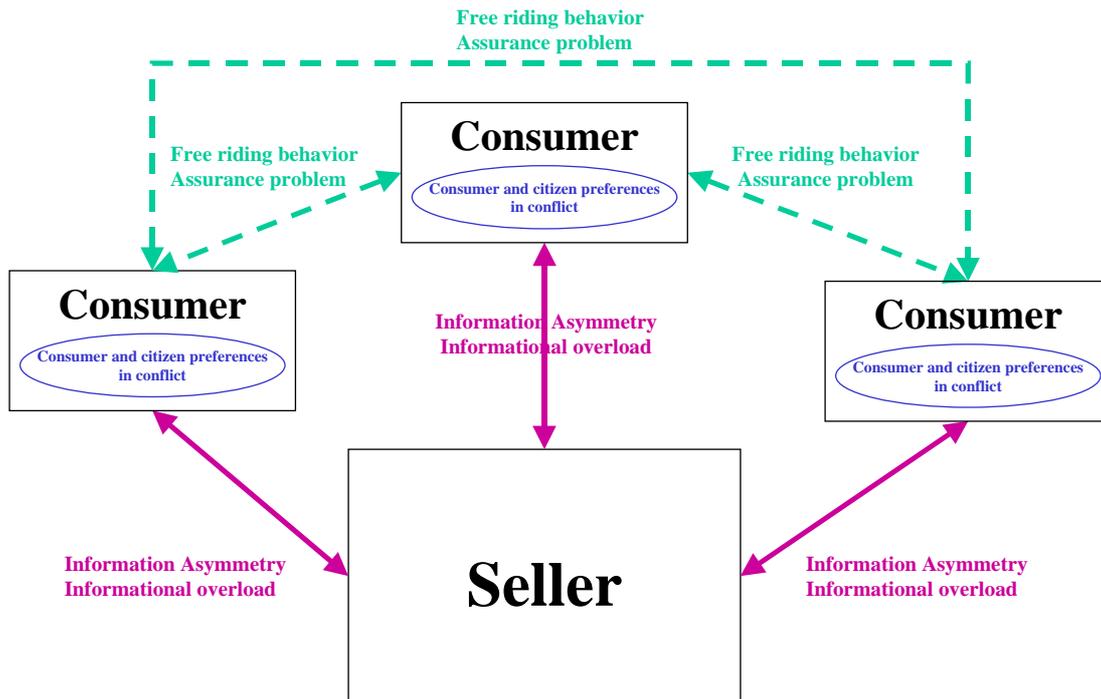


Figure 1: Sources of market failures arising with ecofriendly products

3. How could ecolabeling contribute to mitigate market failures?

In conventional welfare economics, market failure constitutes a potential rationale for governmental intervention. The dispute among economists arises about the degree of necessary governmental intervention in market mechanisms. In this section, we do not deal with direct government intervention, but only with voluntary ecolabeling schemes. Ecolabeling schemes constitute an explicit institution including two fundamental components: a system of rules or principles and a system of enforcement. These institutions correspond to a spectrum with ideal types according to the way of generating the rules (first, second or third party) and the way of enforcement (first, second or third party) (Garcia-Johnson, 2001).

Ecolabeling was originally proposed as a voluntary market-linked tool for addressing market failures resulting from environmental characteristics of products. Ecolabeling communicates environmental characteristics of a product and allows consumers to choose a product closer to their preferences. But solving only the informational asymmetry is not sufficient to restore market efficiency. Indeed, ecolabels in exclusion of other complementary instruments, need to mitigate at the same time, the other causes of market failures previously identified, i.e. the problems generated by public good and informational overload. To overcome these barriers, we propose to design ecolabel as a mix of solutions to each of the previous market failures. Instead of overviewing the abundant literature devoted to potential solutions to each market failure, we select a few solutions, frequently quoted in theoretical and empirical literature and a priori accurate for our topic.

(1) *Providing accurate and credible information by third party certification*

It is well known that producers suffer from a credibility deficit about the environmental information of their products. To solve the adverse selection and cognitive problems generated by credence attributes, participation of credible third parties is generally necessary to manage (i) the definition of what is an ecofriendly food product i.e. the criteria selection allowing to use the ecolabel¹³, (ii) the monitoring of previously defined criteria to check product conformity with the specifications according to a procedure previously elaborated and (iii) the efficient signaling of an ecofriendly product (Grolleau and BenAbid, 2001). An efficient signal allows to distinguish true ecofriendly products from conventional ones (and possibly to rank among different levels of ecofriendliness) at a non-prohibitive cost i.e. to get a separating equilibrium. Indeed, in some circumstances, the transaction costs can be excessive and swallow up consumers' willingness to pay, essentially devoted in their process decision making to production costs. According to the economics of information, the sufficient conditions for a separating equilibrium are (Macho Stadler and Castrillo, 1997): (1) High ability agents can acquire the signal at a lower cost than low ability agents; (2) The expected profit with a signal is greater than the cost of acquiring the signal for high ability agents; and (3) The expected profit with a signal is less than the cost of acquiring the signal for low ability agents. Generally, this signal is a third party certified ecolabel (Caswell and Modjuszka, 1996).

(2) *Designing the ecolabel as a cognitive support for consumers*

In an environment overloaded with information, the success of ecolabels depends on its abilities to capture the consumer's attention rather than only providing factual, correct and complete information unprocessable by consumers (Grolleau and Ben Abid, 2001). This cognitive support can be "markers and knowledge summaries" capable of capturing the consumer's attention without requiring excessive transaction costs (Valceschini, 2000). Barzel argues (1982) that people will use proxies "because the alternative is more costly". Doussan (1998) provides anecdotal evidence that a direct measurement of environmental impacts of farming can require excessive transaction costs. Indeed, a direct measurement of environmental characteristics can require a "sworn inspector monitoring continuously the farmer in each field, with all technical means capable of verifying specific environmental data (...)." (Doussan, 1998). Instead of spending excessive money in direct measurement, the consumer searches for a cognitive support, e.g. an eco-seal of approval, which synthesizes the previous conditions.

Understanding the limited abilities of consumers can help ecolabel designers to realize that the success of ecolabeling requires both capturing attention and providing an informational summary. This informational summary allows consumers not to engage in excessive search and understanding, but generates a "knowledge economy"¹⁴ for the demand side. Some empirical studies argue that effectiveness of capturing the consumer's attention depends more on the reputation and status of the third party than on a precise knowledge of the methods of its intervention. For example, the use of names and logos of well-known environmental associations such as WWF and Green Peace increases visibility as well as credibility of green claims (Leubuscher et al., 1998).

(3) *Reducing free ring by emphasizing private benefits*

In the real world, it seems that people may contribute to public goods at levels that exceed the predictions of the neoclassical theory (charity, donations, etc). Several explanations have been provided, such as the "warm glow" concept (i.e. the increased utility from the act of giving, rather than

¹³ For example, the claim "GMO free" supposes a previous definition of GMO product itself, the choice of a detection threshold and the level of investigation of the food into agrofood chain, e.g. what is about cow's milk bred with GMO cereals?

¹⁴ According to Favereau (1989, p.294), some cognitive devices allow an "economy of knowledge" and "fruitful ignorance areas", because efficiency does not require a complete knowledge.

receiving) (Andreoni,1990) or the presence of social pressure or private inducements (e.g. the contributor derives more important joint private benefits than others from providing a collective good) or even the "Veblen effect" for which consumption may be conspicuous, thereby having a status value (Ackerman, 1997; Leibenstein, 1950). A solution to the assurance problem is "assurance contracts" defined as contractual agreements that contribute to a collective good project (Schmidtz, 1991). These contracts guarantee each party, that his contribution will not be wasted, e.g. by money back guarantees, if the collective good is financially under-supported.

A solution to the public good problems is to add and emphasize private benefits, e.g. health, taste, with the collective benefits of preserving the environment, as some environmental labels of green food products already do. This association between environmental attributes of goods and private ones can come from labeling, but may also already exist in consumer's mind. Intuitively, we understand that low chemical input production (fertilizers and pesticides) may induce low pesticide residues in food, although it is not scientifically supported. For example, the purchase of organic products seems more motivated by self-benefits, i.e. safer products, rather than public environmental benefits, which constitutes a secondary driver. By associating private benefits with public ones, ecolabel designers can reduce free riding and the assurance problem by creating excludability. The market switches to a quasi-conventional one with private goods where environmental attributes are provided as additional public benefits. The purchase driver remains conventional private benefits and environmental attributes are bundled in the product. People are willing to purchase ecofriendly products not only for themselves, but because they also and primarily enjoy the private attributes resulting from an environmentally friendly production. For example, Moon et al. (2002) show that "respondents who are more concerned about food safety associated with vegetables are more likely to be willing to pay a premium for the environmental attributes of agricultural products¹⁵."

In figure 2, we consider that agro-food products are composed of private attributes like health or taste and public environmental attributes. We assume that consumers perceive a link between these two kinds of attributes. Consider a conventional product C on figure 2. Let us consider that product C is now produced with an ecofriendly process. It objectively becomes an ecofriendly product E. Let us now consider consumers' perception of product E. Due to the cognitive problems raised, the consumer's beliefs and marketing efforts, the consumer may perceive product E as having more (or less) environmental attributes than it has in reality. Consumers may perceive product E as having more private attributes than it really has. Consumers may then perceive product E as being product P. In sum, consumers will value environmental attributes as a proxy for other attributes that are private.

¹⁵ Moreover, the premium of ecofriendly of food products can take into account the consumers' insensitiveness to small price changes, well documented in the marketing literature.

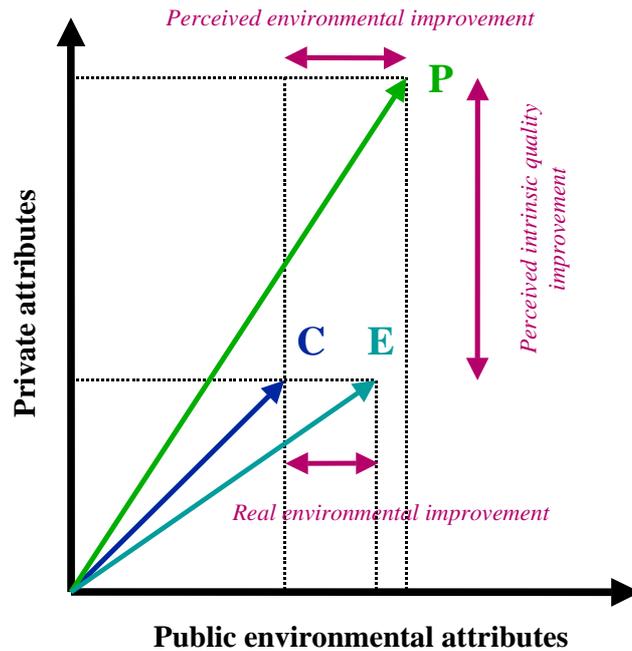


Figure 2: Consumer perception of ecofriendly food products

Many consumers expect that agrofood products from an ecofriendly process will have a better taste than conventional products. According to several experimental studies (Deliza et al., 1999; Johansson et al., 1999), provision of information about environmental impacts of farming methods influence the quality perceived by consumers. For example, a perceived better taste allows consumers to (1) mitigate the free riding and the assurance situations by emphasizing private benefits (2) attenuate information asymmetry because consumers deduce, or at least do not invalidate, the achievement of an ecofriendly process (3) reduce information overload by focusing consumers' attention on a conventional dimension of food quality.

The table 3 stresses that marketers and designers of ecolabels will simultaneously want to switch from focusing mainly on public attributes, to emphasizing private ones; and from credence attributes, to proxies perceived as search or experience attributes by consumers. Examples of these strategies are provided in the following section, where we show how several ecolabels attempt to take into account these potential sources of market failures.

Types of attributes	Search attributes	Experience attributes	Credence attributes
Public attributes	Packaging material	Waste volume - Compressibility of packaging	Environmental process
Private attributes	Aspect of an apple	Taste of an apple	Safety attributes of an apple

Table 3: Guidelines to mitigate market failures in marketing ecofriendly products

4. How do existing ecolabels alleviate the problems of supplying environmental characteristics?

We proposed to design ecolabels that mitigate the problems analyzed in the previous sections. Existing ecolabels have often focused on ways to overcome some of the following problems: asymmetric information, informational overload and public good problems.

Some existing ecolabels help alleviate one problem, and other ecolabels mitigate two or three problems. The International Standard Organization (ISO) distinguishes three types of ecolabels – type I, type II and type III – according to the presence or absence of a third party verification and the type of characteristics certified (Table 3).

Type of ecolabel	Definition by the ISO
Type I: Environmental labeling program	Voluntary, multiple-criteria-based third party program that awards a license which authorizes the use of environmental labels on products indicating overall environmental preferability of a product within a particular product category based on life cycle considerations.
Type II: Self-declared environmental claims	Environmental claim that is made, without independent third-party certification, by manufacturers, importers, distributors, retailers or anyone else likely to benefit from such a claim.
Type III: Environmental declaration	Quantified environmental data of a product under pre-set categories of parameters set by a qualified third party.

Table 3: A classification of ecolabels (ISO 14020, 1998)

We follow this classification to analyze how each type of ecolabel can mitigate market failures.

(1) *Type I ecolabeling*

At the end of the 70s, several countries and groups of countries set up ecolabeling programs (type I ecolabels) (Table 4).

Name	Year	Location	Governmental or Non-Governmental	Number of product categories
Blue Angel	1977	Germany	Governmental	88
Nordic Swan	1989	Denmark, Finland, Iceland, Norway, Sweden	Governmental	42
Green Seal	1989	USA	Private Non-Profit Association	88
European Ecolabel	1992	European Community	Governmental	11
NF Environnement	1992	France	Governmental	6

Table 4: Some type I ecolabels (EPA, 1998)

These seals of approval aim both at encouraging the supply of ecofriendly products as well as enabling consumers to express their preferences for these products. Thus, they were first designed to mitigate the informational asymmetry with regard to marketing environmental attributes of goods. Indeed, a logo points products that are less harmful for the environment than other products in the same category. Type I ecolabels help to mitigate the informational asymmetry between sellers and consumers through the mechanism of third party certification. For consumers, credence attributes become search attributes through the use of credible third parties (Caswell and Mojduzka, 1996). Moreover, the use of logos as informational summaries as well as means to capture the consumer's attention, may aid in mitigating the informational overload problem. However, problems related to the public properties of environmental characteristics remain.

(2) *Type II ecolabeling*

For type II ecolabeling, we applied our analysis to agro-food products in France. Indeed, the French seal of approval NF Environnement and the European Ecolabel exclude food products (Bougherara et al., Forthcoming). France constitutes a favorable field for the development of self-declared ecolabeling (type II). We realized a survey and collected ecolabels on agrofood products in 2001/ 2002 in several representative French stores. We qualitatively analyze how they help mitigate the three problems we identified as for the marketing of environmental attributes (Table 5). Our sample is too small to draw any accurate quantitative analysis. So the percentages given are only indicative.

Product name	Product type	Type of market failures and mechanisms attenuating them			
		Public goods problem	Informational asymmetry	Informational overload	
		Adding private benefits	Adding experience attributes	Third party certification	Logo
Bonduelle	Salad				X
Jordans	Cereals	X	X	X	X
Mac Cain	French fries	X	X		
Coopérative Nangica	Potatoes	X	X		
Mas de Nans	Wheat	X	X		
Trilégumes	Potatoes	X	X		
Fermiers de Loué	Turkey				X
Gerblé	Biscuits	X	X		X
Casino	Fresh Vegetables	X	X	X	X
Carrefour	Fresh Vegetables, Meat	X	X	X	X
Auchan	Fresh Vegetables, Meat	X	X	X	X
Cora	Fresh Vegetables, Meat	X	X	X	X
5 ^{ème} Saison	Salad	X	X	X	
Les Crudettes	Salad	X	X	X	
Florette	Salad	X	X	X	
Candia	Milk				X
Thonon	Mineral water				X
Saupiquet	Tuna				X
Paul	Bread	X	X		X
La Mie Câline	Bread	X	X		
Point Chaud	Bread				
Bret's	Chips				
Peyronnet	Salad				
Nactalia	Milk				
Milka Alp action	Chocolate				X
Number of products		15 out of 25 (60%)	15 out of 25 (60%)	8 out of 25 (32%)	13 out of 25 (52%)

Table 5: How type II ecolabels are designed to mitigate market failures

The analysis shows that type II ecolabels of food products especially use the addition to environmental attributes of health or taste to overcome the public goods problem i.e. added private attributes and the informational asymmetry i.e. added search attributes. This may be specific to food products for which the link between the two kinds of attributes is often already in consumer's mind. A confusion, sustained by marketers' efforts, exists between the impact of the product and its production process on the environment i.e. environmental attributes and the impact of the environment on food products i.e. safety attributes. For example, on some mineral water, it is claimed that "the spring [...] benefits from a natural preserved environment"¹⁶. This water coming from a preserved environment says nothing about the environmental performances of the producer. Rather it is referring to the absence of contamination of water by the production site. The Mac Cain ecolabel claims that the firm "selects safe fields [...] to plant its potatoes"¹⁷. The firm focuses on selecting a safe or non polluted place in

¹⁶ Translated from French.

¹⁷ Translated from French.

order to reduce the risk of environmental contamination of potatoes. It does not promise to decrease the environmental impact of production practices. Besides, some French retailers argue that their fresh products are grown far from any source of pollution e.g. a freeway or a dump. They use this argument to substantiate environmental claims. For the French *Commission Nationale des Labels et des Certificats*¹⁸, the focus of these claims is product safety, not environmental improvements. Indeed, these practices protect agrofood products from a contamination by a polluted environment, but they do not produce environmental goods. It is well-known that environmental claims are frequently spurious and generate consumers' confusion between a "preserved area" and an environmental friendly process of production, i.e. the protection of environment. Many claims are narrowly focused and respond more to safety concerns than to environmental ones (Leubuscher et al., 1998).

Other mechanisms enabling consumers to trust ecolabels appear through the analyzed ecolabels. Indeed, most of the products are branded. Brands may transfer their reputation on the environmental attributes making them more credible. Moreover, some ecolabels refer to sponsoring. Organizations such as WWF or ONF¹⁹ can reinforce the credibility of the seller's claims.

(3) *Type III ecolabels*

Type III ecolabels are defined as quantified environmental data of a product under pre-set categories of parameters set by a qualified third party. The third party certification helps mitigate informational asymmetry but the step of processing the information provided on each product to determine the less harmful for the environment is left to the consumer. Besides, information overload can more or less occur according to the quantity of given environmental data and to the other informational impulses e.g. other labels, store environment. Ecolabels can cover a large spectrum between two extremes. At one side, they can concern only one environmental field or one step of the production process or at the other side, the entire life cycle. Comparing products according to one parameter may be rather easy. However, comparing products across many parameters and making a trade-off among them may be time-consuming and demanding in efforts and may require expert abilities. Wynne (1994, p. 95) claims that "simply making information available to consumers in no way assures that they will process it. One must distinguish between "information provision" and "information impact", because there is no one to one relationship between information provided and the impact, if any, of this information on the recipient". The goal of Scientific Card Certification in creating the Environmental Report Card was to reestablish consumer's sovereignty by leaving to him the right to fully compare products by himself. The transaction costs it raises may be much higher than the expected benefits. Thus, type III ecolabels may be more suited for certain categories of products for which purchase frequency is rather low and for which consumers take time to choose e.g. durable goods like cars, washing machines (Allison and Carter, 2000).

5. Concluding remarks

An important implication of our analysis for ecolabel success is to design ecolabels as providers of mixed solutions to the several market failures. Indeed, the market failures caused by environmental characteristics create an extra social cost for society and ecolabels try to attenuate this situation. But a careful analysis seems necessary to assess that the attempt of mitigating these failures is not more costly than the market failures themselves. Indeed, in some cases we can just shift from a market failure to an ecolabel failure and dissipate money. Consumers' willingnesses to pay may be wasted in high transaction costs rather than used to improve environmental quality. In a new institutional framework, the use of ecolabels as an alternative to another policy tool is efficient if the costs of designing and implementing ecolabeling policies are lower (1) than those of the other solutions to mitigate market failures and (2) than its expected benefits. Other parameters should also be taken into account like institutional environments e.g. property rights to use environmental claims, anti-deception

¹⁸ French Agency of Agro-food Labels.

¹⁹ French National Forest Agency.

laws, level of enforcement, credible sanctions that influence the level of transaction costs and the efficiency of ecolabeling.

There is clearly a number of issues left to investigate. Indeed, ecolabeling raises specific problems. For example, the level of environmental quality is bound to be defined exogenously – by a party exogenous to the seller-buyer relationship – because of the consumer's lacking abilities to define it. The environmental criteria are thus often settled by consulting all the parties e.g. industry, environmental and consumers associations, unions. Some parties may influence the environmental criteria to make them as close as possible to their preferences. Firms attempt to affect products' criteria in order to get the ecolabel without making any environmental efforts or to exclude competitors (Nadaï, 1998). West (1995) states that, "in practice, the needs of industry often takes precedence over those of other interest groups in the decision-making process". For example, in the case of the European Ecolabel for washing machines, he also relates that "all German manufacturers were able to meet the criteria from the beginning", or that "in the Netherlands, 60 percent of the tissue paper produced could meet standards without change to manufacturing practices". This situation leads West (1995) to the following statement: "voluntary eco-labeling scheme are rapidly degenerating into a means whereby industry can set the standard it likes". Moreover, ecolabels can also increase the average environmental quality in the market for similar products e.g. by raising producers' and consumers' awareness in environmental issues. But on the other hand, the purchase of ecolabeled products does not fundamentally change lifestyles and can increase environmental damages by encouraging higher consumption. Assessing ecolabels overall effects is rather complex and would need further theoretical analysis and empirical studies. The multiple dimensions of ecolabeling has opened a large field of investigation certainly still to be deepened.

6. References

- Ackerman F., 1997. Consumed in Theory: Alternative Perspectives on the Economics of Consumption. *Journal of Economic Issues*, 31: 651-664.
- Akerlof G., 1970. The Market for Lemons: Quality Uncertainty and Market Mechanism. *Quarterly Journal of Economics*, 84: 488-500.
- Allison C. and Carter A., 2000. Study on Different Types of Environmental Labelling (ISO Type II and III Labels): Proposal for an Environmental Labelling Strategy. Environmental Resource Management, Study for the DG Environment, European Commission.
- Andersson F., 2002. Pooling Reputation. *International Journal of Industrial Organization*, 20: 715-730.
- Andreoni J., 1990. Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving? *Economic Journal*, 100: 464-477.
- Bougherara D., Grolleau G. and Thiébaud L., Forthcoming. Mise en Perspective et Discussion de l'Exclusion des Produits Agro-alimentaires du Dispositif d'Écolabellisation. *Economie Rurale*.
- Anderson M., Hollingsworth C., Van Zee V., Coli W. and Rhodes M., 1996. Consumer Response to Integrated Pest Management and Certification. *Agriculture, Ecosystems and Environment*, 60: 97-106.
- Barzel Y., 1982. Measurement Costs and the Organization of Markets. *Journal of Law and Economics*, 25(1): 27-48.
- Blend J.F. and Van Ravenswaay E.O., 1997. Using Ecolabeling to Encourage Adoption of Innovative Environmental Technologies in Agriculture. Staff Paper n° 97-19, Michigan State University.
- Blend J.R. and Van Ravenswaay E.O., 1999. Measuring Consumer Demand for Ecolabeled Apples. *American Journal of Agricultural Economics*, 81(5): 1078-1083.

- Caswell JA. and Modjuszka EM., 1996. Using Informational Labelling to Influence the Market for Quality in Food Products. *American Journal of Agricultural Economics*, 78: 1248-1253.
- Commission for Environmental Cooperation, 1999. Measuring Consumer Interest in Mexican Shade-grown Coffee: An Assessment of the Canadian, Mexican and US Market. Montreal, Quebec.
- Darby M.R. and Karni E., 1973. Free Competition and the Optimal Amount of Fraud. *Journal of Law and Economics*, 16: 67-88.
- Davenport T.H. and Beck J.C., 2000. *The Attention Economy*. Harvard Business School Press, Harvard, MA.
- Deliza R., Rosenthal A., Hedderley D., MacFie H.D. and Frewer L.J., 1999. The Importance of Brand, Product Information and Manufacturing Process in the Development of Novel Environmentally Friendly Vegetable Oils. *Journal of International Food and Agribusiness Marketing*, 10(3): 67-77.
- EPA, 1998. Environmental Labeling Issues, Policies and Practices Worldwide. Report for the Pollution Prevention Division, US Environmental Protection Agency.
- Favereau O., 1989. Marchés Internes, Marchés Externes. *Revue Economique*, 40(2): 273-328.
- Garcia-Johnson R., 2001. Certification Institutions in the Protection of the Environment: Exploring the Implications for Governance. 23rd Annual Research Conference of the Association for Public Policy, Analysis and Management, November 1st, Washington, DC.
- Govindasamy R., Italia J., Thatch D. and Adelaja A., 1998. Consumer Response to IPM-grown Produce. *Journal of Extension*, 36 (4). Available at <http://www.joe.org/joe/1998august/rb2.html>.
- Granatstein D., 2000. Emerging Ecolabels for Food Products. Center for Sustaining Agriculture and Natural Resources Washington State University, Wenatchee, WA.
- Grolleau G. and BenAbid S., 2001. Fair Trading in Markets for Credence Goods - An Analysis Applied to Agri-Food Products. *Intereconomics - Review of European Economic Policy*, 36(4): 208-214.
- Hurley S.P. and Kliebenstein J.B., 1999. The Potential For Marketing Pork Products with Embedded Environmental Attributes: Results from an Experimental Study. American Agricultural Economics Association, Annual Meeting, August 8-11, Nashville, Tennessee.
- Johansson L., Haglund Å., Berglund L., Lea P. and Risvik J.E., 1999. Preference for Tomatoes, Affected by Sensory Attributes and Information about Growth Conditions. *Food Quality and Preference*, 10(4-5): 289-298.
- Leibenstein H., 1950. Bandwagon, Snob, and Veblen Effects in the Theory of Consumers' Demand. *Quarterly Journal of Economics*, 64: 183-207.
- Leubuscher S., Hager W., Wattiez C., Mombrù J. and Liaska E., 1998. Study on Verification and Control of Environmental Product Claims. Final Report by Prospect C&S for DG Health and Consumer Protection.
- Macho-Stadler I. and Perez Castrillo D.J. 1997. *Introduction to the Economics of Information: Incentives and Contracts*. Oxford: Oxford University Press.
- Moon W., Florkowski W.J., Brückner B. and Schonhof I., 2002. Willingness to Pay for Environmental Practices: Implications for Eco-Labeling, *Land Economics*, 78(1): 88-102.
- Nadai A., 1998. Concurrence dans la Qualification Environnementale des Produits. *Revue d'Economie Industrielle*, 83: 197-212.
- Nelson P., 1970. Information and Consumer Behaviour. *Journal of Political Economy*. 78: 311-329.

Rahmann G., Ashworth S.W., Boutonnet J.P., Brunori G. and Papadopoulos I., 2001. Opportunities and Barriers for Niche Marketing of Lamb in European LFAs based on consumer attitudes to product quality. *Agrarwirtschaft*, 50: 293-301.

Sagoff M., 1988. *The Economy of the Earth*, Cambridge University Press, Cambridge.

Schmidtz D., 1991. *The Limits of Government, An Essay on the Public Goods Argument*, Westview Press.

Valceschini E., 2000. La Dénomination d'Origine comme Signal de Qualité Crédible. *Revue d'Economie Régionale et Urbaine*. 3: 489-500.

West K., 1995. Ecolabels: The Industrialization of Environmental Standards. *The Ecologist*, 25 (1): 16-21.

Wynne R.D., 1994. The Emperor's New Ecologos? A Critical Review of the Scientific Certification Systems Environmental Report Cards and the Green Seal Certification Mark Programs. *Virginia Environmental Law Journal*, 14: 51-149.

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